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A SMALL CONTACT EPIDEMIC OF TYPHOID FEVER*

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The growing realization of the importance of the transference of infection in typhoid fever through contact, both direct and indirect, especially in the maintenance of the disease in rural communities, prompts the report of the following outbreak.

Maurice is a small Iowa village of about 250 inhabitants. It is chiefly a trading point and place of residence for retired farmers. It does not have either a municipal water supply or a municipal system for the collection and disposal of sewage and garbage. Water is obtained from numerous shallow wells. Excreta are disposed in privy vaults.

Until July, 1916, Maurice had been free from typhoid since 1914; at that time a small epidemic had occurred, apparently due to contact. Subsequent to July 1, 1916, 9 cases of typhoid fever occurred in persons living in Maurice, and 2 in residents of the adjoining country side, a morbidity rate of 360 per 10,000 of population.

During the course of the investigation 2 cases of typhoid fever in the neighboring town of Orange City were investigated and their relationship to the present outbreak established. Some time after the completion of the investigation, it was found that there were 3 additional cases related to the present outbreak, one in Maurice, one in the country side, and one in a child living in Monroe, South Dakota.

By weeks the onset of cases was as follows: First week, beginning July 2, 1 case; 2nd week, 2 cases; 3rd week, 7 cases; 4th week, 2 cases, and 5th week, 1 case.

The distribution of the cases according to age and sex was as follows:

Sex	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	Total
Males	1	4	1	0	1	0	1	1	9
Females	2	3	0	0	0	0	0	0	5
	3	7	1	0	1	0	1	1	14

Patients 1, 3, 4, 5, 11, and 12, residing in Maurice, had not been outside the town. Patient 2, brother of Patient 1, had been in Orange

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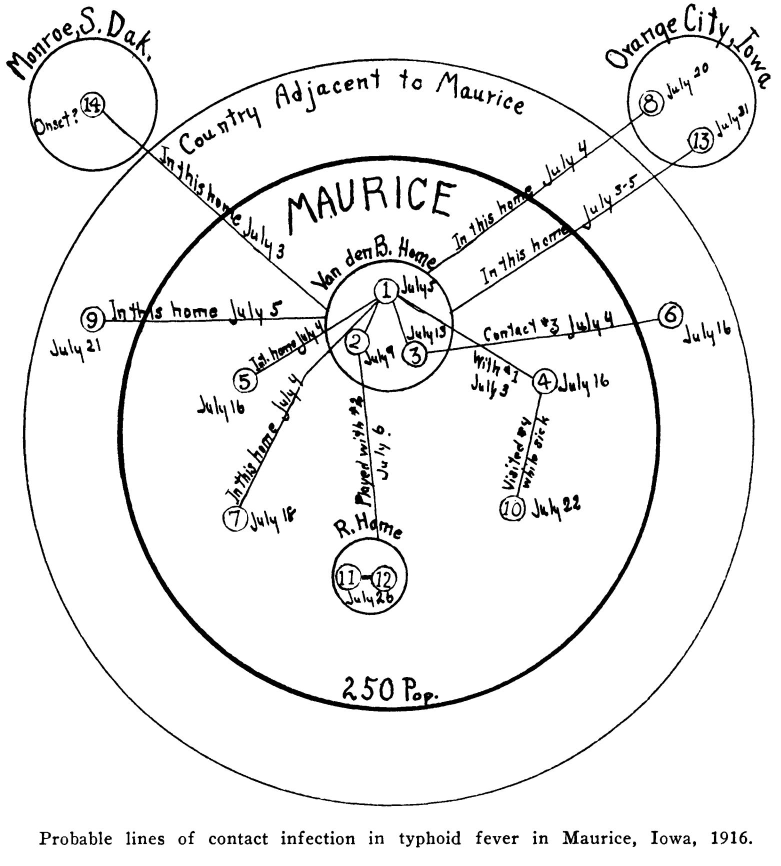
* Received for publication October 12, 1916.

City 2 weeks before he became ill. He had also been in Hawarden and Sioux Center on the same date. Patient 7, a school girl, living in Maurice, had gone to the country for a brief visit and had there become ill after a few days. Patients 6 and 9, living in the country adjacent to Maurice, were in Maurice 12 and 16 days, respectively, before the onset of their illness. Patients 8 and 13, school children living in Orange City, were in Maurice 16 and 26 days before the onset of their illness. The out-of-town patients were in Maurice in the period between the 3rd and the 5th of July. It therefore seems clear that the residents of Maurice contracted the disease within the town and that the out-of-down cases had been in Maurice at a time when they might have received infection. Furthermore, from a study of the out-of-town cases, it would appear that infection must have been contracted early in July.

Patient 1 represents the first case of the outbreak. Patients 2 and 3, her brother and father, developed the disease in the next week. Both had been in contact with her during the early part of her illness. Patient 4, the grandfather of Patient 1, had been with her in the period preceding July 5th, under circumstances that would give plenty of opportunities for the transference of infection. Patients 5, 7, 11, and 12 were playmates of Patients 1 and 2, and had been in contact with them about the time of the onset of illness in Patient 1. Patient 10 was an intimate friend of Patient 4 and had visited with him during the early stages of his illness. Patient 6 had been in contact with Patient 3 at the store of the latter early in July. Patient 9 is a niece of Patient 3 and had been at the home of Patients 1, 2, and 3 on the day before Patient 1 became ill. Patients 8 and 13, living in Orange City, had been at the home of Patients 1, 2, and 3 between the 3rd and the 5th of July, the latter date marking the onset of illness in Patient 1. Patient 14, living in Monroe, South Dakota, had also been at this home on July 3. It is evident, that, the first patient excluded, all those developing typhoid fever subsequently had been in contact with the cases in Patients 1, 2, and 3, or with cases arising therefrom. This is shown in the accompanying diagram.

A consideration of the possibilities for infection through foods, flies, ice cream, milk, drinking water, and swimming, shows that none of these factors was common to all the patients. Patients 1, 2, 3, 4, 5, 8, 9, and 13 had consumed well water from the premises of Patients 1, 2, and 3. Examination of this water showed it to be highly con-



Probable lines of contact infection in typhoid fever in Maurice, Iowa, 1916.

taminated, tho it is not clear from what source excremental material could gain entrance. But the manner in which the cases developed, and the fact that the water was not a factor common to all the cases, together with all other circumstances of the epidemic, indicate that infection was passed directly from person to person, rather than through the indirect agency of infected water.

It is not clear from what source Patient 1 contracted the disease, since she had not been outside of Maurice before her illness. She had been in close contact with 4 persons who had had typhoid fever within recent years, 3 of them during 1914 in the small epidemic previously mentioned, which was apparently due to contact. These individuals were her mother, older sister, cousin, and a distant cousin, who had had typhoid fever 4 years before while in Arabia. During June, 1916, the mother had been confined to her bed by an ill-defined sickness, the chief characteristics of which had been pleurisy and thrombophlebitis. A few years previously she had had a panhysterectomy performed because of carcinoma, and during June had suffered from a recurrence, from which she died during September, 1916. During her illness in June, she had been nursed by her husband and the niece previously mentioned.

This last individual had been away from Maurice several months, having returned but a short time before. It is possible that one of these four individuals might have been a carrier. Examinations of single specimens of feces from the daughter and the cousin were negative.

It seems possible that the pleurisy and thrombophlebitis of the mother might have been the result of latent infection with typhoid bacilli, and that her illness of June was responsible for the infection of the three members of the household. We were unable to secure material from her for bacteriologic examination to decide this point.

In this outbreak of 16 cases, 4 deaths occurred. A circular giving directions for the prevention of typhoid fever and the care of the patients was distributed to each home in the town. No further cases developed.